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EXAMINER	
VILAKAZI, SIZO BINDA	
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3747	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/589,898	NAKASAKA, YUKIHIRO	
	Examiner	Art Unit	
	SIZO B. VILAKAZI	3747	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 May 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-7,9-11,13 and 16-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-7,9-11,13 and 16-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

The Amendments and Applicant arguments submitted on 05/18/2009 have been received and its contents have been carefully considered.

Claims 4, 8, 12, and 14 are cancelled.

Claims 1-3, 5-7, 9-11, 13, and 16-19 are presented for examination.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1, 5, 9, 13, 16, 17, 18, and 19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. In regards to the above listed claims the applicant claims that the injection amount control means "increases or decreases the fuel injection amount from the injection amount for stoichiometric operation by a predetermined amount *at a frequency outside the range of human perception*". This statement is indefinite, as there is no teaching within the claims or the specification as to exactly what frequency would be outside the range of human perception. The examiner further submits that "the range of human perception" would vary from person to person not only based on individual differences (different levels of hearing, motion perception, etc.), but on what a person

may be doing at the time within the cabin of the car, so it is questionable whether a specific frequency may be within the range of one persons perception while being outside of the range of perception of another person. "Human perception" is a variable value, and thus unless a defined limit to the frequency can be established (Example: X amount of cycles per second), this limitation is considered to be indefinite and is thus given no patentable weight.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-3, 5-7, 9-11, 13, and 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shomura (US Patent No. 6,170,465 B1) in view of Ishikawa et al. (US Patent No. 6,975,934 B2), Mashiki (US Patent No. 6,176,220 B1), Sugiyama et al. (US Patent 6,792,901 B2), and further in view of Maloney (US Patent 6,481,273 B2).

6. In Re claims 1-3, Shomura discloses

   a. An injection amount control means for changing a fuel injection amount from an injection amount for stoichiometric operation to either an increased amount or a decreased amount (Fig. 1, item 23, Column 7, Lines 36-43, and Lines 54-62)

b. A computation means for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount is changed by the injection amount control means (Fig. 1, item 39, Column 7, Lines 54-62 and Column 8, Lines 10-14)

c. that the various detected values detected by the various sensors, or the values stored in the control unit could be output to the vehicle's tachometer or other such device (Column 14, Lines 38-67)

d. that the rotation speed change is stored in the control unit (Column 10, Lines 17-22), therefore it is a value capable of being output

7. With regards to the "injection amount control means for changing a fuel injection amount from an injection amount for stoichiometric operation to either an increased amount or a decreased amount" within claim 1, this limitation meets the three prong test per MPEP 2181 and thereby invokes 35 USC 112 6th paragraph. The "injection amount control means for changing a fuel injection amount from an injection amount for stoichiometric operation to either an increased amount or a decreased amount" is explained on Page 29, Lines 3-14 and Fig. 1, item 18 in the specification. Shomura teaches a means for changing the fuel injection amount (Column 7, Lines 36-43, and Lines 54-62). The method taught by Shomura is considered to be equivalent because it performs the same function in substantially the same way and produces substantially the same result as the corresponding element in the applicant's specification.

8. With regards to the "computation means for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount is changed by the

injection amount control means" within claim 1, this limitation meets the three prong test per MPEP 2181 and thereby invokes 35 USC 112 6th paragraph. The "computation means for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount is changed by the injection amount control means" is explained on Page 29, Lines 15-21 in the specification. Shomura teaches a means for determining the rotation speed change that occurs when the fuel injection amount is changed (Column 7, Lines 54-62 and Column 8, Lines 10-14). The method taught by Shomura is considered to be equivalent because it performs the same function in substantially the same way and produces substantially the same result as the corresponding element in the applicant's specification.

9. With regards to the "output means for outputting the torque or rotation speed change amount determined by the computation means as an index value that indicates the degree of intake air amount variation among the cylinders" within claim 1, this limitation meets the three prong test per MPEP 2181 and thereby invokes 35 USC 112 6th paragraph. The "output means for outputting the torque or rotation speed change amount determined by the computation means as an index value that indicates the degree of intake air amount variation among the cylinders" is explained on Page 30, Lines 9-26 in the specification.

10. Shomura does not disclose output means for outputting the torque or rotation speed change amount determined by the computation means *as an index value that indicates the degree of intake air amount variation among the cylinders*

11. However, Ishikawa et al. acknowledge that the variation in air intake amount can be detected or corrected based on the engine torque or rotational speed variation resulting from a change in fuel injection amount (Column 1, Line 64 through Column 2 Line 40)

12. Therefore it would have been obvious to modify the system disclosed by Shomura with the use of torque or rotation speed change amount as an index value that indicates the degree of intake air amount variation as disclosed by Ishikawa et al. in order to precisely control torque variation within the engine.

13. Shomura/Ishikawa et al. do not disclose the comparison and judgment means as set forth in the claim.

14. However, Mashiki discloses

a. comparison means for comparing a predetermined reference value with the amount of a change that occurs when the injection amount control means changes the fuel injection amount from the injection amount for stoichiometric operation (Column 10, Lines 58-63; and Column 14, Lines 5-26);

b. and judgment means, which, when comparing the change to the reference value, judges that a permissible level is exceeded by the air intake amount variations among the cylinders (Column 10, Line 65 through Column 11, Line 17).

15. The examiner notes that Mashiki compares the predetermined reference value (dlnv – C1) to the amount of change that occurred (dln), and judges that a permissible torque variation is exceeded as evidenced by the subsequent change in fuel injection

amount (Column 11, Lines 15-17). As has already been discussed, Ishikawa discloses that it is common knowledge in the art that excess torque variation is linked to air intake variation, thus in judging that excess torque variation has been exceeded, Mashiki judges that a permissible level of intake air amount variation is exceeded.

16. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Shomura/Ishikawa with the system disclosed by Mashiki in order to make adjustments to the fuel injection amount only when an excessive amount of air amount variation among cylinders occurs.

17. Shomura/Ishikawa/Mashiki do not disclose the conversion means as set forth in the claims.

18. However Sugiyama et al. disclose a control system with the claimed conversion means for converting the intake air amount variations among the cylinders to intake valve operating angle variations among the cylinders and/or intake valve lift amount variations among the cylinders (Column 1, Lines 44-55)

19. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system disclosed by Shomura/Ishikawa/Mashiki with the operating angle conversion means disclosed by Sugiyama et al in order to accurately adjust the intake air amounts in each cylinder of the engine.

20. Shomura/Ishikawa et al./Mashiki/Sugiyama et al. do not disclose computation means extracts a change component having the same frequency as a fuel injection amount change frequency etc.

21. However, filtering process is common knowledge in the art, as is evidenced by Maloney, who discloses the claimed response filtering process (Column 1, Line 45 through Column 2, Line 2).

22. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made the modify the system disclosed by Shomura/Ishikawa et al./Mashiki/Sugiyama et al. with the filtering process disclosed by Maloney in order to get a more accurate assessment of change in torque as a result of a single fuel injection.

23. In Re claims 5-7, Shomura discloses

a. An injection amount control means for changing a fuel injection amount for a particular one of the cylinders from an injection amount for stoichiometric operation to either an increased amount or a decreased amount (Column 7, Lines 36-43 and Lines 54-62, Column 10, Lines 61-67)

b. A computation means for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount for the particular cylinder is changed by the injection amount control means (Column 7, Lines 54-62 and Column 8, Lines 10-14)

c. that the various detected values detected by the various sensors, or the values stored in the control unit could be output to the vehicle's tachometer or other such device (Column 14, Lines 38-67)

d. that the rotation speed change is stored in the control unit (Column 10, Lines 17-22), therefore it is a value capable of being output

24. With regards to the "An injection amount control means for changing a fuel injection amount for a particular one of the cylinders from an injection amount for stoichiometric operation to either an increased amount or a decreased amount" within claim 1, this limitation meets the three prong test per MPEP 2181 and thereby invokes 35 USC 112 6th paragraph. The "injection amount control means for changing a fuel injection amount from an injection amount for stoichiometric operation to either an increased amount or a decreased amount" is explained on Page 35, Lines 3-18 and Fig. 1, item 18 in the specification. Shomura teaches a means for changing the fuel injection amount (Column 7, Lines 36-43, and Lines 54-62). The method taught by Shomura is considered to be equivalent because it performs the same function in substantially the same way and produces substantially the same result as the corresponding element in the applicant's specification.

25. With regards to the "computation means for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount for the particular cylinder is changed by the injection amount control means" within claim 1, this limitation meets the three prong test per MPEP 2181 and thereby invokes 35 USC 112 6th paragraph. The "computation means for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount for the particular cylinder is changed by the injection amount control means" is explained on Page 35, Lines 19-22 in the specification. Shomura teaches a means for determining the rotation speed change that occurs when the fuel injection amount is changed (Column 7, Lines 54-62 and Column 8, Lines 10-14). The method taught by Shomura is considered to be

equivalent because it performs the same function in substantially the same way and produces substantially the same result as the corresponding element in the applicant's specification.

26. With regards to the "output means for outputting the torque or rotation speed change amount determined by the computation means as an index value that indicates the degree of intake air amount variation in the particular cylinder" within claim 1, this limitation meets the three prong test per MPEP 2181 and thereby invokes 35 USC 112 6th paragraph. The "output means for outputting the torque or rotation speed change amount determined by the computation means as an index value that indicates the degree of intake air amount variation in the particular cylinder" is explained on Page 36, Lines 1-21 in the specification.

27. Shomura does not disclose output means for outputting the torque or rotation speed change amount determined by the computation means as an index value that indicates the degree of intake air amount variation in the particular cylinder.

28. However, Ishikawa et al. acknowledge that the variation in air intake amount can be detected or corrected based on the engine torque or rotational speed variation resulting from a change in fuel injection amount (Column 1, Line 64 through Column 2 Line 40).

29. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified system disclosed by Shomura with the information disclosed by Ishikawa et al. to arrive at an output means for outputting torque or rotation speed change amount determined by the computation means as an

index value that indicates the degree of intake air amount variation in the particular cylinder, with the purpose in mind of adjusting the intake air in accordance with the torque variation (Ishikawa, Col. 2, line 36-41).

30. Furthermore, Shomura/Ishikawa et al. do not disclose the comparison and judgment means as set forth in the claim.

31. However, Mashiki discloses

a. comparison means for comparing a predetermined reference value with the amount of a change that occurs when the injection amount control means changes the fuel injection amount from the injection amount for stoichiometric operation (Column 10, Lines 58-63; and Column 14, Lines 5-26));

b. and judgment means, which, when comparing the change to the reference value, judges that a permissible level is exceeded by the air intake amount variations among the cylinders (Column 10, Line 65 through Column 11, Line 17).

32. The examiner notes that Mashiki compares the predetermined reference value (dlnv – C1) to the amount of change that occurred (dln), and judges that a permissible torque variation is exceeded as evidenced by the subsequent change in fuel injection amount (Column 11, Lines 15-17). As has already been discussed, Ishikawa discloses that it is common knowledge in the art that excess torque variation is linked to air intake variation, thus in judging that excess torque variation has been exceeded, Mashiki judges that a permissible level of intake air amount variation is exceeded.

33. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Shomura/Ishikawa with the system disclosed by Mashiki in order to make adjustments to the fuel injection amount only when an excessive amount of air amount variation among cylinders occurs.

34. Shomura/Ishikawa/Mashiki do not disclose the conversion means as set forth in the claims.

35. However Sugiyama et al. disclose a control system with the claimed conversion means for converting the intake air amount variations among the cylinders to intake valve operating angle variations among the cylinders and/or intake valve lift amount variations among the cylinders (Column 1, Lines 44-55)

36. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system disclosed by Shomura/Ishikawa/Mashiki with the operating angle conversion means disclosed by Sugiyama et al in order to accurately adjust the intake air amounts in each cylinder of the engine.

37. Shomura/Ishikawa et al./Mashiki/Sugiyama et al. do not disclose computation means extracts a change component having the same frequency as a fuel injection amount change frequency etc.

38. However, filtering process is common knowledge in the art, as is evidenced by Maloney, who discloses the claimed response filtering process (Column 1, Line 45 through Column 2, Line 2).

39. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made the modify the system disclosed by Shomura/Ishikawa et al./Mashiki/Sugiyama et al. with the filtering process disclosed by Maloney in order to get a more accurate assessment of change in torque as a result of a single fuel injection.

40. In Re claims 9-11, Shomura discloses

a. An injection amount control means for changing a fuel injection amount from an injection amount for stoichiometric operation to either an increased amount or a decreased amount (Column 7, Lines 36-43 and Lines 54-62, Column 10, Lines 61-67)

b. A computation means for determining on an individual cylinder basis the amount of a torque or rotation speed change that occurs when the fuel injection amount is changed by the injection amount control means (Column 7, Lines 54-62 and Column 8, Lines 10-14)

c. that the various detected values detected by the various sensors, or the values stored in the control unit could be output to the vehicle's tachometer or other such device (Column 14, Lines 38-67)

d. that the rotation speed change is stored in the control unit (Column 10, Lines 17-22), therefore it is a value capable of being output

41. With regards to the "injection amount control means for changing a fuel injection amount for a particular one of the cylinders from an injection amount for stoichiometric operation to either an increased amount or a decreased amount" within claim 1, this

limitation meets the three prong test per MPEP 2181 and thereby invokes 35 USC 112 6th paragraph. The "injection amount control means for changing a fuel injection amount from an injection amount for stoichiometric operation to either an increased amount or a decreased amount" is explained on Page 41, Lines 5-7 and Fig. 1, item 18 in the specification. Shomura teaches a means for changing the fuel injection amount (Column 7, Lines 36-43, and Lines 54-62). The method taught by Shomura is considered to be equivalent because it performs the same function in substantially the same way and produces substantially the same result as the corresponding element in the applicant's specification.

42. With regards to the "computation means for determining on an individual cylinder basis the amount of a torque or rotation speed change that occurs when the fuel injection amount is changed by the injection amount control means" within claim 1, this limitation meets the three prong test per MPEP 2181 and thereby invokes 35 USC 112 6th paragraph. The "computation means for determining on an individual cylinder basis the amount of a torque or rotation speed change that occurs when the fuel injection amount is changed by the injection amount control means" is explained on Page 41, Lines 11-14 in the specification. Shomura teaches a means for determining the rotation speed change that occurs when the fuel injection amount is changed (Column 7, Lines 54-62 and Column 8, Lines 10-14). The method taught by Shomura is considered to be equivalent because it performs the same function in substantially the same way and produces substantially the same result as the corresponding element in the applicant's specification.

43. With regards to the "output means for outputting the torque or rotation speed change amount determined by the computation means as an index value that indicates the degree of intake air amount variation in an individual cylinder" within claim 1, this limitation meets the three prong test per MPEP 2181 and thereby invokes 35 USC 112 6th paragraph. The "output means for outputting the torque or rotation speed change amount determined by the computation means as an index value that indicates the degree of intake air amount variation in an individual cylinder" is explained on Page 41, Lines 25 through Page 42, Line 22 in the specification.

44. Shomura does not disclose output means for outputting the torque or rotation speed change amount determined by the computation means as an index value that indicates the degree of intake air amount variation in an individual cylinder.

45. However, Ishikawa et al. acknowledge that the variation in air intake amount can be detected or corrected based on the engine torque or rotational speed variation resulting from a change in fuel injection amount (Column 1, Line 64 through Column 2 Line 24).

46. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified system disclosed by Shomura with the information disclosed by Ishikawa et al. to arrive at an output means for outputting torque or rotation speed change amount determined by the computation means as an index value that indicates the degree of intake air amount variation in an individual cylinder, with the purpose in mind of adjusting the intake air in accordance with the torque variation (Ishikawa, Col. 2, line 36-41).

47. Furthermore, Shomura/Ishikawa et al. do not disclose the comparison and judgment means as set forth in the claim.

48. However, Mashiki discloses

a. comparison means for comparing a predetermined reference value with the amount of a change that occurs when the injection amount control means changes the fuel injection amount from the injection amount for stoichiometric operation (Column 10, Lines 58-63; and Column 14, Lines 5-26));

b. and judgment means, which, when comparing the change to the reference value, judges that a permissible level is exceeded by the air intake amount variations among the cylinders (Column 10, Line 65 through Column 11, Line 17).

49. The examiner notes that Mashiki compares the predetermined reference value (dlnv – C1) to the amount of change that occurred (dln), and judges that a permissible torque variation is exceeded as evidenced by the subsequent change in fuel injection amount (Column 11, Lines 15-17). As has already been discussed, Ishikawa discloses that it is common knowledge in the art that excess torque variation is linked to air intake variation, thus in judging that excess torque variation has been exceeded, Mashiki judges that a permissible level of intake air amount variation is exceeded.

50. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Shomura/Ishikawa with the system disclosed by Mashiki in order to make adjustments to the fuel injection amount only when an excessive amount of air amount variation among cylinders occurs.

51. Shomura/Ishikawa/Mashiki do not disclose the conversion means as set forth in the claims.

52. However Sugiyama et al. disclose a control system with the claimed conversion means for converting the intake air amount variations among the cylinders to intake valve operating angle variations among the cylinders and/or intake valve lift amount variations among the cylinders (Column 1, Lines 44-55)

53. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system disclosed by Shomura/Ishikawa/Mashiki with the operating angle conversion means disclosed by Sugiyama et al in order to accurately adjust the intake air amounts in each cylinder of the engine.

54. Shomura/Ishikawa et al./Mashiki/Sugiyama et al. do not disclose computation means extracts a change component having the same frequency as a fuel injection amount change frequency etc.

55. However, filtering process is common knowledge in the art, as is evidenced by Maloney, who discloses the claimed response filtering process (Column 1, Line 45 through Column 2, Line 2).

56. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made the modify the system disclosed by Shomura/Ishikawa et al./Mashiki/Sugiyama et al. with the filtering process disclosed by Maloney in order to get a more accurate assessment of change in torque as a result of a single fuel injection.

57. In Re claim 13, Shomura discloses:

a. first injection amount control means for changing the fuel injection amount for a particular one of the cylinders from an injection amount for stoichiometric operation to an increased amount (Fig. 1, item 23, Column 7, Lines 36-43, and Lines 54-62)

b. output means for outputting the torque or rotation speed change amount determined by the first computation means and the torque or rotation speed change amount determined by the second computation means as index values that indicate the degree of intake air amount variation in the particular cylinder (see claim 1 rejection above)

58. Shomura does not disclose:

a. first computation means for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount for the particular cylinder is changed by the first injection amount control means

b. second injection amount control means, which, when the torque or rotation speed change amount determined by the first computation means is not greater than a predetermined reference value, decreases the fuel injection amount for the particular cylinder from the injection amount for stoichiometric operation

c. second computation means for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount for the particular cylinder is changed by the second injection amount control means (

59. However, Mashiki discloses:

a. first computation means for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount for the particular cylinder is changed by the first injection amount control means (Column 9, Lines 54-58)

b. second injection amount control means, which, when the torque or rotation speed change amount determined by the first computation means is not greater than a predetermined reference value, decreases the fuel injection amount for the particular cylinder from the injection amount for stoichiometric operation (Column 10, Line 58 through Column 11, Line 17)

c. second computation means for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount for the particular cylinder is changed by the second injection amount control means (Column 9, Lines 22-29)

60. With regards to the "first computation means for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount for the particular cylinder is changed by the first injection amount control means" within claim 1, this limitation meets the three prong test per MPEP 2181 and thereby invokes 35 USC 112 6th paragraph. The "first computation means for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount for the particular cylinder is changed by the first injection amount control means" is explained on Page 55, Line 26 through Page 56, Line 1in the specification. Mashiki teaches a means for determining the amount of a torque or rotation speed change that occurs when the fuel

injection amount for the particular cylinder is changed by the first injection amount control means (Column 9, Lines 54-58). The method taught by Mashiki is considered to be equivalent because it performs the same function in substantially the same way and produces substantially the same result as the corresponding element in the applicant's specification.

61. With regards to the "second injection amount control means, which, when the torque or rotation speed change amount determined by the first computation means is not greater than a predetermined reference value, decreases the fuel injection amount for the particular cylinder from the injection amount for stoichiometric operation" within claim 1, this limitation meets the three prong test per MPEP 2181 and thereby invokes 35 USC 112 6th paragraph. The "second injection amount control means, which, when the torque or rotation speed change amount determined by the first computation means is not greater than a predetermined reference value, decreases the fuel injection amount for the particular cylinder from the injection amount for stoichiometric operation" is explained on Page 57, Lines 11-16 in the specification. Mashiki teaches a means, which, when the torque or rotation speed change amount determined by the first computation means is not greater than a predetermined reference value, decreases the fuel injection amount for the particular cylinder from the injection amount for stoichiometric operation (Column 10, Line 58 through Column 11, Line 17). The method taught by Mashiki is considered to be equivalent because it performs the same function in substantially the same way and produces substantially the same result as the corresponding element in the applicant's specification.

62. With regards to the "second computation means for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount for the particular cylinder is changed by the second injection amount control means" within claim 1, this limitation meets the three prong test per MPEP 2181 and thereby invokes 35 USC 112 6th paragraph. The "second computation means for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount for the particular cylinder is changed by the second injection amount control means" is explained on Page 57, Lines 16-18 in the specification. Mashiki teaches a means for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount for the particular cylinder is changed by the second injection amount control means (Column 9, Lines 22-29). The method taught by Mashiki is considered to be equivalent because it performs the same function in substantially the same way and produces substantially the same result as the corresponding element in the applicant's specification.

63. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified system disclosed by Shomura with the invention disclosed by Mashiki to arrive at the current invention.

64. Furthermore, Shomura/Ishikawa et al. do not disclose the comparison and judgment means as set forth in the claim.

65. However, Mashiki discloses

a. comparison means for comparing a predetermined reference value with the amount of a change that occurs when the injection amount control means

changes the fuel injection amount from the injection amount for stoichiometric operation (Column 10, Lines 58-63);

b. and judgment means, which, when comparing the change to the reference value, judges that a permissible level is exceeded by the air intake amount variations among the cylinders (Column 10, Line 65 through Column 11, Line 17).

66. The examiner notes that Mashiki compares the predetermined reference value (dlnv – C1) to the amount of change that occurred (dln), and judges that a permissible torque variation is exceeded as evidenced by the subsequent change in fuel injection amount (Column 11, Lines 15-17). As has already been discussed, Ishikawa discloses that it is common knowledge in the art that excess torque variation is linked to air intake variation, thus in judging that excess torque variation has been exceeded, Mashiki judges that a permissible level of intake air amount variation is exceeded.

67. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Shomura/Ishikawa with the system disclosed by Mashiki in order to make adjustments to the fuel injection amount only when an excessive amount of air amount variation among cylinders occurs.

68. Shomura/Ishikawa/Mashiki do not disclose the conversion means as set forth in the claims.

69. However Sugiyama et al. disclose a control system with the claimed conversion means for converting the intake air amount variations among the cylinders to intake

valve operating angle variations among the cylinders and/or intake valve lift amount variations among the cylinders (Column 1, Lines 44-55)

70. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system disclosed by Shomura/Ishikawa/Mashiki with the operating angle conversion means disclosed by Sugiyama et al in order to accurately adjust the intake air amounts in each cylinder of the engine.

71. Shomura/Ishikawa et al./Mashiki/Sugiyama et al. do not disclose computation means extracts a change component having the same frequency as a fuel injection amount change frequency etc.

72. However, filtering process is common knowledge in the art, as is evidenced by Maloney, who discloses the claimed response filtering process (Column 1, Line 45 through Column 2, Line 2).

73. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made the modify the system disclosed by Shomura/Ishikawa et al./Mashiki/Sugiyama et al. with the filtering process disclosed by Maloney in order to get a more accurate assessment of change in torque as a result of a single fuel injection.

74. In Re claims 16-18, Shomura discloses

a. An injection amount control unit for changing a fuel injection amount from an injection amount for stoichiometric operation to either an increased amount or

a decreased amount in a particular cylinder, or on an individual cylinder basis (Column 5, Lines 24-26, and Column 7, Lines 17-30)

b. A computation unit for determining on an individual cylinder basis the amount of a torque or rotation speed change that occurs when the fuel injection amount is changed by the injection amount control means in a particular cylinder, or on an individual cylinder basis (Column 8, Lines 10-14)

c. An output unit for outputting the torque or rotation speed change amount determined by the computation unit as an index value that indicates the degree of intake air amount variations among the cylinders (Column 14, Lines 38-67)

75. Shomura does not disclose the comparison and judgment units as set forth in the claim.

76. However, Mashiki discloses

a. a comparison unit for comparing a predetermined reference value with the amount of a change that occurs when the injection amount control means changes the fuel injection amount from the injection amount for stoichiometric operation (Column 10, Lines 58-63);

b. and a judgment unit, which, when comparing the change to the reference value, judges that a permissible level is exceeded by the air intake amount variations among the cylinders (Column 10, Line 65 through Column 11, Line 17).

77. The examiner notes that Mashiki compares the predetermined reference value (dlnv – C1) to the amount of change that occurred (dln), and judges that a permissible

torque variation is exceeded as evidenced by the subsequent change in fuel injection amount (Column 11, Lines 15-17). As has already been discussed, Ishikawa discloses that it is common knowledge in the art that excess torque variation is linked to air intake variation, thus in judging that excess torque variation has been exceeded, Mashiki judges that a permissible level of intake air amount variation is exceeded.

78. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Shomura/Ishikawa with the system disclosed by Mashiki in order to make adjustments to the fuel injection amount only when an excessive amount of air amount variation among cylinders occurs.

79. Shomura/Ishikawa/Mashiki do not disclose the conversion means as set forth in the claims.

80. However Sugiyama et al. disclose a control system with the claimed conversion means for converting the intake air amount variations among the cylinders to intake valve operating angle variations among the cylinders and/or intake valve lift amount variations among the cylinders (Column 1, Lines 44-55)

81. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system disclosed by Shomura/Ishikawa/Mashiki with the operating angle conversion means disclosed by Sugiyama et al in order to accurately adjust the intake air amounts in each cylinder of the engine.

82. Shomura/Ishikawa et al./Mashiki/Sugiyama et al. do not disclose computation means extracts a change component having the same frequency as a fuel injection amount change frequency etc.

83. However, filtering process is common knowledge in the art, as is evidenced by Maloney, who discloses the claimed response filtering process (Column 1, Line 45 through Column 2, Line 2).

84. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made the modify the system disclosed by Shomura/Ishikawa et al./Mashiki/Sugiyama et al. with the filtering process disclosed by Maloney in order to get a more accurate assessment of change in torque as a result of a single fuel injection.

85. In Re claim 19, Shomura discloses:

a. first injection amount control unit for changing the fuel injection amount for a particular one of the cylinders from an injection amount for stoichiometric operation to an increased amount (Column 5, Lines 24-26, and Column 7, Lines 17-30)

b. output unit for outputting the torque or rotation speed change amount determined by the first computation means and the torque or rotation speed change amount determined by the second computation means as index values that indicate the degree of intake air amount variation in the particular cylinder (Column 14, Lines 38-67)

86. Shomura does not disclose:

a. first computation unit for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount for the particular cylinder is changed by the first injection amount control means

b. second injection amount control unit, which, when the torque or rotation speed change amount determined by the first computation means is not greater than a predetermined reference value, decreases the fuel injection amount for the particular cylinder from the injection amount for stoichiometric operation

c. second computation unit for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount for the particular cylinder is changed by the second injection amount control means (

87. However, Mashiki discloses:

a. first computation unit for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount for the particular cylinder is changed by the first injection amount control means (Column 8, Lines 60-65)

b. second injection amount control unit, which, when the torque or rotation speed change amount determined by the first computation means is not greater than a predetermined reference value, decreases the fuel injection amount for the particular cylinder from the injection amount for stoichiometric operation (Column 8, Lines 38-42)

c. second computation unit for determining the amount of a torque or rotation speed change that occurs when the fuel injection amount for the particular

cylinder is changed by the second injection amount control means (Column 8, Lines 60-65)

d. a comparison unit for comparing a predetermined reference value with the amount of a change that occurs when the injection amount control means changes the fuel injection amount from the injection amount for stoichiometric operation (Column 10, Lines 58-63);

e. a judgment unit, which, when comparing the change to the reference value, judges that a permissible level is exceeded by the air intake amount variations among the cylinders (Column 10, Line 65 through Column 11, Line 17).

88. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified system disclosed by Shomura with the invention disclosed by Mashiki to arrive at the current invention.

89. Shomura/Ishikawa/Mashiki do not disclose the conversion means as set forth in the claims.

90. However Sugiyama et al. disclose a control system with the claimed conversion means for converting the intake air amount variations among the cylinders to intake valve operating angle variations among the cylinders and/or intake valve lift amount variations among the cylinders (Column 1, Lines 44-55)

91. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system disclosed by Shomura/Ishikawa/Mashiki with the operating angle conversion means disclosed by

Sugiyama et al in order to accurately adjust the intake air amounts in each cylinder of the engine.

92. Shomura/Ishikawa et al./Mashiki/Sugiyama et al. do not disclose computation means extracts a change component having the same frequency as a fuel injection amount change frequency etc.

93. However, filtering process is common knowledge in the art, as is evidenced by Maloney, who discloses the claimed response filtering process (Column 1, Line 45 through Column 2, Line 2).

94. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made the modify the system disclosed by Shomura/Ishikawa et al./Mashiki/Sugiyama et al. with the filtering process disclosed by Maloney in order to get a more accurate assessment of change in torque as a result of a single fuel injection.

Response to Arguments

95. Applicant's arguments with respect to the claims 1, 5, 9, 13, 16, 17, 18, and 19 regarding Yomogida and the “frequency outside the range of human perception” have been considered but are moot in view of the new ground(s) of rejection (see 112 rejection above).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SIZO B. VILAKAZI whose telephone number is (571)270-3926. The examiner can normally be reached on M-F: 10:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen K. Cronin can be reached on (571) 272-4536. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SIZO B VILAKAZI/
Examiner, Art Unit 3747

/Stephen K. Cronin/
Supervisory Patent Examiner, Art Unit 3747